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EXAMINER

BAREFORD, KATHERINE A

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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/630,658
Filing Date: July 31, 2003
Appellant(s): TAYLOR, THOMAS A.

MAILED
MAR 30 2007
GROUP 1700

Gerald L. Coon
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed January 5, 2007 appealing from the Office action mailed June 28, 2007.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

5,738,281	ZURECKI ET AL	4-1998
5,486,383	NOWOTARSKI ET AL	1-1996

Taylor, et al, "Experience with MCrAl and thermal barrier coatings produced via inert gas shrouded plasma deposition", J. Vac. Sci. Technol. A, Vol. 3, No. 6, Nov/Dec 1985, pages 2526-2531.

The admitted state of the prior art, pages 4-5 of the specification of the present case.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

1. **Claims 1-13 and 21-22 stand finally rejected under 35 U.S.C. 103(a) as being unpatentable over Zurecki et al (US 5738281) in view of Nowotarski et al (US 5486383) and the admitted state of the prior art.**

Zurecki teaches a method of placing a gas shroud around a turbulent gas jet.

Column 1, lines 5-15. This method can be used in spraying applications, such as thermal spray coating. *Column 4, lines 15-25.* An effluent jet exits from an orifice of the thermal spray device and is surrounded with a coaxial gas shield having a shield gas flow substantially surrounding the effluent of the thermal spray device. *Column 3, lines 1-25.* By using an inert surrounding gas, when thermal spraying, the amount of oxygen aspirated into the jet is reduced, thus minimizing the oxidation of the sprayed coating material and providing a desired microstructure of a coating with minimized oxidation of the coating material as supplied. *Column 4, lines 15-25.* As shown by Example 3, oxygen concentration in the spray jets of shrouded spray devices of Zurecki can be well over 50% less than for unshrouded jets at the same standoff distance (3 inches). *Column 9, lines 45-55 and column 11, lines 10-60, note, for example, in run no. 2, for example, with no shroud gas flow, the first or "0" flow rate, oxygen conc. is 14.0, going down to 2.1 as the flow rate of the shroud gas is increased (Table 2).*

Claim 3: As shown by Example 3, oxygen concentration in the spray jets of shrouded spray devices of Zurecki can be well over 50% less than for unshrouded jets at the same standoff distance (3 inches). *Column 9, lines 45-55 and column 11, lines 10-60, note, for example, in run no. 2, for example, with no shroud gas flow, the first or "0" flow rate, oxygen conc. is 14.0, going down to 2.1 as the flow rate of the shroud gas is increased (Table 2).*

Claim 4, 5: the gas flow can be essentially turbulent. *Column 3, lines 5-30 (the spray effluent from the spray device is turbulent, and the shroud gas is entrained in that flow).*

Claim 9: the shield (shroud) gas can be nitrogen. *See column 11, lines 10-60.*

Zurecki teaches all the features of these claims except (1) that the resulting effect of the shield gas on microstructure will allow an extended standoff distance for the same microstructure, as compared to without using a shield gas, (2) that the material to be sprayed is a ceramic oxide (claim 2, 6, 11, 21), which would be not sensitive to oxidation or nitridation (claim 1), (3) that the shield gas is argon (claim 10), (4) that the ceramic oxide is zirconia (claims 7, 12), (5) that the multiple layers of coating material are provided (claims 8, 13), (6) that the substrate has a complex shape such as turbine blades or vanes (claims 1, 22) and (7) the specific gas temperature effects of using the shield gas (claim 1).

However, Nowotarski teaches that when thermal spraying, a turbulent fluid stream is ejected from a spray nozzle. *Column 3, lines 20-60.* The stream can carry coating material which can be metals, alloys, oxides, ceramics, and other materials. *Column 3, lines 20-65.* Nowotarski teaches the desire to surround the stream with a shielding gas flow of an inert gas such as nitrogen, argon, etc. *See column 3, line 60 through column 4, line 40.* The use of this shielding gas prevents oxygen from entering the spray stream so that oxidation or contamination or degradation of materials is minimized. *Column 4, lines 20-35.* The amount of shielding fluid used is such that the oxygen level at the point of impact can be less than 1%. *Column 4, lines 25-35.* Nowotarski teaches that by reducing the oxygen level, the standoff distance can be increased. *Column 7, lines 35-55.*

The admitted state of the prior art, *at pages 4-5 of the specification*, teaches that it is well known to apply ceramic coatings by thermal spraying. These ceramic coatings can include thermal barrier coatings. The thermal barrier coatings are often multilayer coatings with a metallic bond coat followed by a ceramic top coat. The ceramic top coat is usually based on zirconium oxide (zirconia -- zirconia would be non-sensitive material as claimed -- see claim 12 of the present application). The metallic bond coat can also be applied by thermal spraying. The admitted state of the art further teaches that it is well known to apply these thermal spray coatings to complex shapes such as turbine vanes.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to (1) modify Zurecki to use the shield gas system to increase the standoff distance but still achieve the same microstructure resulting from spraying without the shield gas at a shorter standoff distance as suggested by Nowotarski in order to provide a desirable coating, because Zurecki teaches that the use of the coaxial shielding gas provides a decreased oxygen level in the spray stream for a given distance, thus reducing oxidation of the applied coating (that is, providing a desired microstructure of limited further oxidation effects) and Nowotarski teaches that the use of shielding gas that provides a decreased oxygen level in the spray stream for a given distance can allow an increased standoff distance, and that the shielding gas can be used to reduce oxidation, contamination or degradation of the material (again providing a desired microstructure). This provides a longer standoff distance to get the

same microstructure as without shielding, because the resulting microstructure provided by the presence of a first amount of oxygen will not occur until a longer standoff distance when shielding is used since that first amount of oxygen will be present in the stream a much greater distance (more than 50 % as shown by Zurecki) from the nozzle. The standoff distance would be increased more than 50% since the contents of the stream that produces the effective microstructure occurs at a more than 50% greater distance. (2) It would further have been obvious to modify Zurecki to perform the spraying with ceramic oxides, which would be materials not sensitive to oxidation or nitridation (as they have already been oxidized), as taught by Nowotarski with an expectation of desirable coating results, because Zurecki teaches a desirable shield gas spraying system and Nowotarski teaches the desire to shield coatings of ceramics and oxides as well as metals, as the shield also prevents contamination as well as oxidation. (3) It would further have been obvious to modify Zurecki to perform the shielding with argon as taught by Nowotarski with an expectation of desirable coating results, because Zurecki teaches the desire to shield with an inert gas, such as nitrogen, and Nowotarski also teaches the desire to shield coating sprays with inert gases, and that inert gas for shielding can beneficially include argon as well as nitrogen. (4), (5), (6) It would further have been obvious to modify Zurecki in view of Nowotarski to apply a zirconia coating (zirconia would be non-sensitive material as claimed – see claim 12 of the present application), to apply a multilayer coating such as a thermal barrier coating of metallic bond coat followed by ceramic top coat, and to apply the coating to a

complex shape such as a turbine vane/blade using the shielded gas system as suggested by the admitted state of the prior art with an expectation of providing a desirable coating, because Zurecki in view of Nowotarski teaches a gas shielding system for thermal spraying that can be beneficially used with metals or ceramic oxides and the admitted state of the prior art teaches that when thermal spraying a desirable coating system to apply is metal bond coats followed by zirconia (zirconium oxide) top coats to a complex shaped substrate such as a turbine vane/blade. (7) As to the specific gas temperature effects of using the shield gas (as claimed in the last six lines of claim 1), it is the Examiner's position that such temperature effects would naturally occur with the use of the process of Zurecki in view of Nowotarski and the admitted state of the prior art as described above, because it is the suggested use of the shield gas that provides these gas temperature effects, and the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). For example, the Examiner notes that Zurecki provides increasing flow rates of shield gas in its own tests (see Table 2, column 11, line 35).

2. Claims 1-13 and 21-22 stand finally rejected under 35 U.S.C. 103(a) as being unpatentable over Zurecki et al (US 5738281) in view of Nowotarski et al (US

5486383) and Taylor, et al "Experience with M Cr Al and thermal barrier coatings produced via inert gas shrouded plasma deposition" (hereinafter Taylor article).

Zurecki teaches a method of placing a gas shroud around a turbulent gas jet. *Column 1, lines 5-15.* This method can be used in spraying applications, such as thermal spray coating. *Column 4, lines 15-25.* An effluent jet exits from an orifice of the thermal spray device and is surrounded with a coaxial gas shield having a shield gas flow substantially surrounding the effluent of the thermal spray device. *Column 3, lines 1-25.* By using an inert surrounding gas, when thermal spraying, the amount of oxygen aspirated into the jet is reduced, thus minimizing the oxidation of the sprayed coating material and providing a desired microstructure of a coating with minimized oxidation of the coating material as supplied. *Column 4, lines 15-25.* As shown by Example 3, oxygen concentration in the spray jets of shrouded spray devices of Zurecki can be well over 50% less than that for unshrouded jets at the same standoff distance (3 inches). *Column 9, lines 45-55 and column 11, lines 10-60, note, for example, in run no. 2, for example, with no shroud gas flow, the first or "0" flow rate, oxygen conc. is 14.0, going down to 2.1 as the flow rate of the shroud gas is increased (Table 2).*

Claim 3: As shown by Example 3, oxygen concentration in the spray jets of shrouded spray devices of Zurecki can be well over 50% less than that for unshrouded jets at the same standoff distance (3 inches). *Column 9, lines 45-55 and column 11, lines 10-60, note, for example, in run no. 2, for example, with no shroud gas flow, the first or "0" flow rate, oxygen conc. is 14.0, going down to 2.1 as the flow rate of the shroud gas is increased (Table 2).*

Claim 4, 5: the gas flow can be essentially turbulent. *Column 3, lines 5-30 (the spray effluent from the spray device is turbulent, and the shroud gas is entrained in that flow).*

Claim 9: the shield (shroud) gas can be nitrogen. *See column 11, lines 10-60.*

Zurecki teaches all the features of these claims except (1) that the resulting effect of the shield gas on microstructure will allow an extended standoff distance for the same microstructure as compared to without using shield gas, (2) that the material to be sprayed is a ceramic oxide (claim 2, 6, 11, 21), which would be not sensitive to oxidation or nitridation (claim 1), (3) that the shield gas is argon (claim 10), (4) that the ceramic oxide is zirconia (claims 7, 12), (5) that the multiple layers of coating material are provided (claims 8, 13), (6) that the substrate has a complex shape such as turbine blades or vanes (claims 1, 22) and (7) the gas temperature effects of using the shield gas (claim 1).

However, Nowotarski teaches that when thermal spraying, a turbulent fluid stream is ejected from a spray nozzle. *Column 3, lines 20-60.* The stream can carry coating material which can be metals, alloys, oxides, ceramics, and other materials. *Column 3, lines 20-65.* Nowotarski teaches the desire to surround the stream with a shielding gas flow of an inert gas such as nitrogen, argon, etc. *See column 3, line 60 through column 4, line 40.* The use of this shielding gas prevents oxygen from entering the spray stream so that oxidation or contamination or degradation of materials is minimized. *Column 4, lines 20-35.* The amount of shielding fluid used is such that the oxygen level at the point of impact can be less than 1%. *Column 4, lines 25-35.*

Nowotarski teaches that by reducing the oxygen level, the standoff distance can be increased. *Column 7, lines 35-55.*

Taylor article teaches that it is well known to apply ceramic coatings by plasma spraying, a form of thermal spraying. *Page 2526-2527.* These ceramic coatings can include thermal barrier coatings. *Page 2526-2527.* The thermal barrier coatings can be multilayer coatings with a metallic bond coat followed by a ceramic top coat. *Page 2527.* The ceramic top coat is can be based on zirconium oxide (zirconia-- zirconia would be non-sensitive material as claimed – see claim 12 of the present application). *Page 2527.* The metallic bond coat can also be applied by plasma spraying. *Page 2527 (the M Cr Al coat).* Taylor article further teaches that it is well known to apply these thermal spray coatings to complex shapes such as turbine vanes. *See page 2530, first column.* Taylor article also teaches that it is beneficial to apply the M Cr Al coat by shrouded (shielded gas) plasma spraying. *Pages 2526-2527.* Furthermore, Taylor article teaches that the oxide ceramic thermal barrier overcoat can also desirably be applied by the same shrouded plasma spray (SPS) system, allowing the two layer system to be applied in the same setup using the same torch by simply switching from one powder dispenser to another. *Page 2527, first column.* The shrouding (shielding) gas can be argon. *Page 2526.*

It would have been obvious to one of ordinary skill in the art at the time the invention was made to (1) modify Zurecki to use the shield gas system to increase the standoff distance but still achieve the same microstructure resulting from spraying without the shield gas at a shorter standoff distance as suggested by Nowotarski and

Taylor article in order to provide a desirable coating, because Zurecki teaches that the use of the coaxial shielding gas provides a decreased oxygen level in the spray stream for a given distance, thus reducing oxidation of the applied coating (that is, providing a desired microstructure of limited further oxidation effects) and Nowotarski teaches that the use of shielding gas that provides a decreased oxygen level in the spray stream for a given distance can allow an increased standoff distance, and that the shielding gas can be used to reduce oxidation, contamination or degradation of the material (again providing a desired microstructure) and Taylor article further teaches that it is desirable to use a shrouding (shielding) gas when thermal spraying materials such as oxide thermal barrier coatings to provide more efficient spraying. This provides a longer standoff distance to get the same microstructure as without shielding, because the resulting microstructure provided by the presence of a first amount of oxygen will not occur until a longer standoff distance when shielding is used since that first amount of oxygen will be present in the stream a much greater distance (more than 50 % as shown by Zurecki) from the nozzle. The standoff distance would be increased more than 50% since the contents of the stream that produces the effective microstructure occurs at a more than 50% greater distance. (2), (4), (5), (6) It would further have been obvious to modify Zurecki to perform the spraying with ceramic oxides, such as zirconia (zirconia would be non-sensitive material as claimed – see claim 12 of the present application), which would be materials not sensitive to oxidation or nitridation (as they have already been oxidized), and to apply a multilayer coating such as a thermal barrier coating of

metallic bond coat followed by ceramic top coat, and to apply the coating to a complex shape such as a turbine vane/blade using the shielded gas system as suggested by Nowotarski and Taylor article with an expectation of desirable coating results, because Zurecki teaches a desirable shielded gas spraying system, and Nowotarski teaches the desire to shield coatings of ceramics and oxides as well as metals, as the shield also prevents contamination as well as oxidation, and Taylor article further teaches that when thermal spraying a desirable coating system to apply is metal bond coats followed by zirconia top coats to a complex shaped substrate such as a turbine vane/blade using a shrouded (shield gas) plasma spraying system. (3) It would further have been obvious to modify Zurecki to perform the shielding with argon as taught by Nowotarski and Taylor article with an expectation of desirable coating results, because Zurecki teaches the desire to shield with an inert gas, such as nitrogen, and Nowotarski also teaches the desire to shield coating sprays with inert gases, and that inert gas for shielding can beneficially include argon as well as nitrogen and Taylor article further teaches the use of argon as a shielding gas when plasma spraying oxides. (7) As to the specific gas temperature effects of using the shield gas (as claimed in the last six lines of claim 1); it is the Examiner's position that such temperature effects would naturally occur with the use of the process of Zurecki in view of Nowotarski and Taylor article as described above, because it is the suggested use of the shield gas that provides these gas temperature effects, and the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis

for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). For example, the Examiner notes that Zurecki provides increasing flow rates of shield gas in its own tests (see Table 2, column 11, line 35).

(10) Response to Argument

(A) Initial Arguments

Appellant initially provides general arguments as to the claims, at pages 4-6 of the Appeal Brief of January 5, 2007, noting the benefits of their claimed invention. The Examiner notes that at page 4, second full paragraph, appellant argues that "... gas shields known in the art are used to prevent or reduce the oxidation of reactive materials such as metals during deposition. It would be thought by those skilled in the art to be nonsensical to use such a shield when spraying with a material not sensitive to oxidation or nitridation as claimed by Appellant." The Examiner disagrees with that statement. The cited references to both Nowotarski and Taylor article contradict that statement. Nowotarski is directed to providing a gas shield, and specifically teaches that the coating material can be "plastics", "oxides", "ceramics" and "certain glasses" (column 3, lines 55-60). Many materials in this grouping are well known to commonly be insensitive to oxidation or nitridation (oxides, for example, already have been oxidized), and Nowotarski provides no limitations as to which of these materials can be used. Moreover, Nowotarski also provides that the gas shield not only minimizes

oxidation, but also "contamination" and "degradation" of materials (column 4, lines 20-30). Secondly, Taylor article further provides the explicit teaching of spraying thermal barrier oxide coatings using the shrouded (shielded) gas system (page 2527, first column). Therefore, it is clearly suggested to one of ordinary skill in the art that it is known and desired in the thermal spray art to use a gas shield when spraying oxides, etc. materials that would not be sensitive to oxidation or nitridation as claimed.

As to appellant's arguments at page 4-5 that they have discovered additional benefits of using the gas shield, including the temperature range and the temperature effect with flow rate, it remains the Examiner's position, as discussed in the *Grounds of Rejection* above, that such temperature results would naturally occur with the use of the process of Zurecki in view of Nowotarski and either the admitted state of the prior art or Taylor article as described above, because it is the suggested use of the shield gas that provides these gas temperature results, and the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). For example, the Examiner notes that Zurecki provides increasing flow rates of shield gas in its own tests (see Table 2, column 11, line 35), which would provided the protecting of the effluent and variations in the temperature effect, if any, due to the "increasing flow rate of the shield gas" as claimed in claim 1.

As to appellant's arguments at pages 5-6 of other benefits of using the gas shield, the Examiner notes again that as discussed in the *Grounds of Rejection* above, the combinations of references provides for the spray process as claimed, and the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). Appellant has provided no arguments here against the combinations of references as provided by the Examiner.

(B) The 35 USC 103 rejection of claims 1-13, 21 and 22 using Zurecki in view of Nowotarski and the admitted state of the prior art

Appellant's Arguments

Appellant notes that the primary reference to Zurecki does not teach various features of the independent and dependent claims, as was noted by the Examiner in the rejection of the claims. Appellant further argues that the cited secondary references, Nowotarski and the admitted state of the prior art, add nothing to make up for the deficiencies of Zurecki as the primary reference. Specifically, according to appellant, there is no disclosure or suggestion to provide

"... using a coaxial gas shield in thermal spraying a material not sensitive to oxidation or nitridation, lengthening the standoff distance between the surface of the substrate having a complex shape and the exit end of a shielded thermal spray device (i.e., at least 20% longer than the standoff distance of a non-shielded thermal spray device) without degradation of the microstructure or other properties of the coating on

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the substrate surface, attaining a temperature effect in which the temperature of the thermal spray effluent is substantially higher close to the thermal spray device and the rate of temperature decline with distance from the thermal spray device is substantially lower than without the shield gas, and that, surprisingly, the temperature effect does not continuously increase with increasing flow rate of the shield gas, but that there is an optimum flow rate, thereby permitting the application of thermal spray coatings on complex shapes such as turbine blades and vanes, without degradation of the microstructure or other properties of the coating." (see the paragraph bridging pages 7-8 of the Appeal Brief of January 5, 2007)

Appellant goes on to submit that alleged obviousness of the instantly claimed invention must be

"... predicated on something more than it would have been obvious to try using a coaxial gas shield in thermal spraying a material not sensitive to oxidation or nitridation in order to lengthen the standoff distance without degradation of the microstructure or other properties of a coating and to attain the temperature effect that surprisingly does not continuously increase with increasing flow rate of the shield gas, to arrive at Appellant's claimed thermal spraying method or the possibility that such a particularly defined method for lengthening the standoff and attaining the temperature effect, thereby permitting the application of thermal spray coatings on complex shapes such as turbine blades and vanes, without degradation of the microstructure or other properties of the coating, would have been considered in the future, having been neglected in the past." (see page 8 of the Appeal Brief of January 5, 2007)

This is because case law provides that "obvious to try" is not a valid test of patentability.

Furthermore, according to appellant, it is only by hindsight that the Examiner could impute to the disclosures of Zurecki, Nowotarski and the admitted state of the prior art the features as cited in the paragraph above, and such hindsight obviousness after the invention as been made is not the proper test.

The Examiner's Response

The Examiner has reviewed appellant's arguments, however, her position that the claimed invention is obvious is maintained. Appellant's statements at page 6 to the first four lines of page 8 of the Appeal Brief of January 5, 2007 amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references. The mere statements at pages 7-8 that the secondary references, Nowotarski and the admitted state of the prior art, add nothing to make up for the deficiencies of Zurecki as the primary reference, followed by a statement that there is no disclosure or suggestion to provide what appears to be a general description of all features of independent claim 1, simply does not provide arguments "which distinctly and specifically points out the supposed errors in the examiner's action" as required by 37 CFR 1.111(b). In fact, as noted in 37 CFR 41.37 (c)(1)(vii), with regard to arguments provided in appeal briefs, "A statement which merely points out what a claim recites will not be considered an argument for separate patentability of the claim." MPEP 1205.02 also notes that in the discussion of 37 CFR 41.37(c)(1)(vii), "A statement which merely points out what a claim recites will not be considered an argument for patentability of the claim." Thus, the Examiner understands appellant's statements at page 7 to the first four lines of page 8 to not provide an argument for patentability of the claims. Furthermore, as to appellant's references to an "optimum flow rate" (page 8, lines 1-3), it is noted that such an "optimum flow rate" is not recited in the rejected claim(s). Although the claims are

interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

At page 8 of the Appeal Brief of January 5, 2007, appellant further submits that the alleged obviousness of the claimed invention must be predicated on something more than a "obvious to try" argument, describing virtually all of the features of claim 1 under this "obvious to try" position. In response, the Examiner notes that she has not taken a position of "obvious to try". Rather, in the rejection of the claims as discussed in the *Grounds of Rejection* above, the Examiner has noted what Zurecki specifically teaches, and what features of all the claims Zurecki does not specifically teach. Then, the Examiner has provided the teachings of the secondary reference, followed by a motivation statement addressing the obviousness of modifying Zurecki to provide for every feature not specifically taught by Zurecki. Appellant has not indicated what modification was considered "obvious to try" beyond a statement that merely points out what claim 1 recites. As a result, it appears that for the reasons discussed in the paragraph immediately above, appellant has not provided an actual argument for patentability of the claims. However, for clarity, the Examiner has provided a breakdown of the entire motivation statement from the rejection of the claims in the *Grounds of Rejection* above and why "obvious to try" was not used (the original motivation statement is provided in italics and the discussion as to why not "obvious to try" is provided in regular type):

It would have been obvious to one of ordinary skill in the art at the time the invention was made to (1) modify Zurecki to use the shield gas system to increase the standoff distance but still achieve the same microstructure resulting from spraying without the shield gas at a shorter standoff distance as suggested by Nowotarski in order to provide a desirable coating, because Zurecki teaches that the use of the coaxial shielding gas provides a decreased oxygen level in the spray stream for a given distance, thus reducing oxidation of the applied coating (that is, providing a desired microstructure of limited further oxidation effects) and Nowotarski teaches that the use of shielding gas that provides a decreased oxygen level in the spray stream for a given distance can allow an increased standoff distance, and that the shielding gas can be used to reduce oxidation, contamination or degradation of the material (again providing a desired microstructure). This provides a longer standoff distance to get the same microstructure as without shielding, because the resulting microstructure provided by the presence of a first amount of oxygen will not occur until a longer standoff distance when shielding is used since that first amount of oxygen will be present in the stream a much greater distance (more than 50 % as shown by Zurecki) from the nozzle. The standoff distance would be increased more than 50% since the contents of the stream that produces the effective microstructure occurs at a more than 50% greater distance. Here, the secondary reference to Nowotarski specifically provides that one of ordinary skill in the art would understand that the use of a shielding gas that provides a decreased oxygen level allows an increased standoff distance. It would not be "obvious to try" to get increased standoff with the same microstructure, when both references teaches the decreased oxygen level that results

from the use of the shielding gas and Nowotarski specifically provides that increased standoff will result. Moreover, it would not be "obvious to try" to use a standoff of more than 20% longer, when the primary reference to Zureck specifically shows that oxygen will not be present in the shielded stream at unshielded amounts until the stream has traveled 50% longer. (2) *It would further have been obvious to modify Zurecki to perform the spraying with ceramic oxides, which would be materials not sensitive to oxidation or nitridation (as they have already been oxidized), as taught by Nowotarski with an expectation of desirable coating results, because Zurecki teaches a desirable shield gas spraying system and Nowotarski teaches the desire to shield coatings of ceramics and oxides as well as metals, as the shield also prevents contamination as well as oxidation.* As to the use of ceramic oxides, the secondary reference to Nowotarski specifically provides that the use of ceramics and oxides are well known when spraying with shielded gas, and thus it would not have been "obvious to try" to spray with such oxides in a shielded gas system, but rather an expected process. (3) *It would further have been obvious to modify Zurecki to perform the shielding with argon as taught by Nowotarski with an expectation of desirable coating results, because Zurecki teaches the desire to shield with an inert gas, such as nitrogen, and Nowotarski also teaches the desire to shield coating sprays with inert gases, and that inert gas for shielding can beneficially include argon as well as nitrogen.* As to shielding with argon, the secondary reference to Nowotarski specifically shows the desire to use argon as well as nitrogen for gas shielding, and thus, it would not have been "obvious to try" to spray with argon shielding gas in a shielding gas system, but rather an expected process. (4), (5), (6) *It*

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would further have been obvious to modify Zurecki in view of Nowotarski to apply a zirconia coating (zirconia would be non-sensitive material as claimed – see claim 12 of the present application), to apply a multilayer coating such as a thermal barrier coating of metallic bond coat followed by ceramic top coat, and to apply the coating to a complex shape such as a turbine vane/blade using the shielded gas system as suggested by the admitted state of the prior art with an expectation of providing a desirable coating, because Zurecki in view of Nowotarski teaches a gas shielding system for thermal spraying that can be beneficially used with metals or ceramic oxides and the admitted state of the prior art teaches that when thermal spraying a desirable coating system to apply is metal bond coats followed by zirconia (zirconium oxide) top coats to a complex shaped substrate such as a turbine vane/blade. As to the selection of zirconia as a spray material, applying a multilayer coating such as a thermal barrier coating of metallic bond coat followed by ceramic top coat, and to apply the coating to a complex shape such as a turbine vane/blade, the admitted state of the prior art specifically shows the desire to provide these features as part of a thermal spraying process, and thus, it would not have been “obvious to try” to thermal spray with these features, but rather expected materials and substrates to use when thermal spraying. (7) As to the specific gas temperature effects of using the shield gas (as claimed in the last six lines of claim 1), it is the Examiner’s position that such temperature effects would naturally occur with the use of the process of Zurecki in view of Nowotarski and the admitted state of the prior art as described above, because it is the suggested use of the shield gas that provides these gas temperature effects, and the fact that applicant has recognized another advantage which would flow naturally from

following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See Ex parte Obiaya, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). For example, the Examiner notes that Zurecki provides increasing flow rates of shield gas in its own tests (see Table 2, column 11, line 35). Here, the Examiner is not of the position that it would have been "obvious to try" to get these gas results, but rather that they would flow naturally from following the suggestion of the prior art.

Therefore, for the reasons discussed above, the Examiner is of the position that the obviousness of the claimed invention is clearly based on more than "obvious to try."

At pages 8-9 of the Appeal Brief of January 5, 2007, appellant further submits that it is only by improper hindsight that the Examiner could impute the invention as claimed to the disclosures of Zurecki, Nowotarski, and the admitted state of the prior art. The Examiner disagrees. Appellant has not indicated what modification or position was considered hindsight beyond a statement that merely points out what claim 1 recites. As a result, it appears that for the reasons discussed in the first paragraph of this *Examiner's Response* to section (B), appellant has not provided an actual argument for patentability of the claims. Furthermore, for clarity, the Examiner notes that in response to appellant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned

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only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). Here, as discussed in detail in the paragraph above, and in the rejection of the claims in the *Grounds of Rejection* above, the Examiner has noted what Zurecki specifically teaches, and what features of all the claims Zurecki does not specifically teach. Then, the Examiner has provided the teachings of the secondary references, followed by a motivation statement which addresses the obviousness of modifying Zurecki to provide for every feature not specifically taught by Zurecki. This motivation, as fully described in the paragraph above, is not based on improper hindsight reasoning, but rather only knowledge which was within the level of ordinary skill at the time the claimed invention was made. While the Examiner has used knowledge from applicant's disclosure, this was from the section of the admitted state of the prior art, as noted in the rejection of the claims above, and it is perfectly proper for the Examiner to use information based on the admitted state of the prior art.

(C) The 35 USC 103 rejection of claims 1-13, 21 and 22 using Zurecki in view of Nowotarski and Taylor Article

Appellant's Arguments

Appellant notes that the primary reference to Zurecki does not teach various features of the independent and dependent claims, as was noted by the Examiner in the rejection of the claims. Appellant further argues that the cited secondary references,

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Nowotarski and Taylor article, add nothing to make up for the deficiencies of Zurecki as the primary reference. Specifically, according to appellant, there is no disclosure or suggestion to provide

“... using a coaxial gas shield in thermal spraying a material not sensitive to oxidation or nitridation, lengthening the standoff distance between the surface of the substrate having a complex shape and the exit end of a shielded thermal spray device (i.e., at least 20% longer than the standoff distance of a non-shielded thermal spray device) without degradation of the microstructure or other properties of the coating on the substrate surface, attaining a temperature effect in which the temperature of the thermal spray effluent is substantially higher close to the thermal spray device and the rate of temperature decline with distance from the thermal spray device is substantially lower than without the shield gas, and that, surprisingly, the temperature effect does not continuously increase with increasing flow rate of the shield gas, but that there is an optimum flow rate, thereby permitting the application of thermal spray coatings on complex shapes such as turbine blades and vanes, without degradation of the microstructure or other properties of the coating.” (see the paragraph bridging pages 10-11 of the Appeal Brief of January 5, 2007)

Appellant goes on to submit that alleged obviousness of the instantly claimed invention must be

“... predicated on something more than it would have been obvious to try using a coaxial gas shield in thermal spraying a material not sensitive to oxidation or nitridation in order to lengthen the standoff distance without degradation of the microstructure or other properties of a coating and to attain the temperature effect that surprisingly does not continuously increase with increasing flow rate of the shield gas, to arrive at Appellant's claimed thermal spraying method or the possibility that such a particularly defined method for lengthening the standoff and attaining the temperature effect, thereby permitting the application of thermal spray coatings on complex shapes such as turbine blades and vanes, without degradation of the microstructure or other properties of the coating, would have been considered in the future, having been neglected in the past.” (see page 11 of the Appeal Brief of January 5, 2007)

This is because case law provides that “obvious to try” is not a valid test of patentability.

Furthermore, according to appellant, it is only by hindsight that the Examiner could impute to the disclosures of Zurecki, Nowotarski and Taylor article the features as cited in the paragraph above, and such hindsight obviousness after the invention as been made is not the proper test.

The Examiner's Response

The Examiner has reviewed appellant's arguments, however, her position that the claimed invention is obvious is maintained. Appellant's statements at page 9 to the first seven lines of page 11 of the Appeal Brief of January 5, 2007 amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references. The mere statements at pages 10-11 that the secondary references, Nowotarski and Taylor Article, add nothing to make up for the deficiencies of Zurecki as the primary reference, followed by a statement that there is no disclosure or suggestion to provide what appears to be a general description of all features of independent claim 1, simply does not provide arguments "which distinctly and specifically points out the supposed errors in the examiner's action" as required by 37 CFR 1.111(b). In fact, as noted in 37 CFR 41.37 (c)(1)(vii), with regard to arguments provided in appeal briefs, "A statement which merely points out what a claim recites will not be considered an argument for separate patentability of the claim." MPEP 1205.02 also notes that in the discussion of 37 CFR 41.37(c)(1)(vii), "A statement which merely points out what a claim recites will not be considered an argument for patentability of the claim." Thus, the Examiner

understands appellant's statements at page 9 to the first seven lines of page 11 to not provide an argument for patentability of the claims. Furthermore, as to appellant's references to an "optimum flow rate" (page 11, lines 4-6), it is noted that such an "optimum flow rate" is not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

At page 11 of the Appeal Brief of January 5, 2007, appellant further submits that the alleged obviousness of the claimed invention must be predicated on something more than a "obvious to try" argument, describing virtually all of the features of claim 1 under this "obvious to try" position. In response, the Examiner notes that she has not taken a position of "obvious to try". Rather, in the rejection of the claims above, the Examiner has noted what Zurecki specifically teaches, and what features of all the claims Zurecki does not specifically teach. Then, the Examiner has provided the teachings of the secondary reference, followed by a motivation statement addressing the obviousness of modifying Zurecki to provide for every feature not specifically taught by Zurecki. Appellant has not indicated what modification was considered "obvious to try" beyond a statement that merely points out what claim 1 recites. As a result, it appears that for the reasons discussed in the paragraph immediately above, appellant has not provided an actual argument for patentability of the claims. However, for clarity, the Examiner has provided a breakdown of the entire motivation statement from the rejection of the claims in the *Grounds of Rejection* above and why

"obvious to try" was not used (the original motivation statement is provided in italics and the discussion as to why not "obvious to try" is provided in regular type):

It would have been obvious to one of ordinary skill in the art at the time the invention was made to (1) modify Zurecki to use the shield gas system to increase the standoff distance but still achieve the same microstructure resulting from spraying without the shield gas at a shorter standoff distance as suggested by Nowotarski and Taylor article in order to provide a desirable coating, because Zurecki teaches that the use of the coaxial shielding gas provides a decreased oxygen level in the spray stream for a given distance, thus reducing oxidation of the applied coating (that is, providing a desired microstructure of limited further oxidation effects) and Nowotarski teaches that the use of shielding gas that provides a decreased oxygen level in the spray stream for a given distance can allow an increased standoff distance, and that the shielding gas can be used to reduce oxidation, contamination or degradation of the material (again providing a desired microstructure) and Taylor article further teaches that it is desirable to use a shrouding (shielding) gas when thermal spraying materials such as oxide thermal barrier coatings to provide more efficient spraying. This provides a longer standoff distance to get the same microstructure as without shielding, because the resulting microstructure provided by the presence of a first amount of oxygen will not occur until a longer standoff distance when shielding is used since that first amount of oxygen will be present in the stream a much greater distance (more than 50 % as shown by Zurecki) from the nozzle. The standoff distance would be increased more than 50% since the contents of the stream that produces the effective microstructure occurs at a more than 50% greater distance. Here, the secondary reference to

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Nowotarski specifically provides that one of ordinary skill in the art would understand that the use of a shielding gas that provides a decreased oxygen level allows an increased standoff distance, and the reference to Taylor article provides that it is also desirable to use shielding gas when thermal spraying oxides. It would not be "obvious to try" to get increased standoff with the same microstructure, when Zurecki and Nowotarski both teach the decreased oxygen level that results from the use of the shielding gas and Nowotarski specifically provides that increased standoff will result. Moreover, it would not be "obvious to try" to use a standoff of more than 20% longer, when the primary reference to Zureck specifically shows that oxygen will not be present in the shielded stream at unshielded amounts until the stream has traveled 50% longer. (2), (4), (5), (6) *It would further have been obvious to modify Zurecki to perform the spraying with ceramic oxides, such as zirconia (zirconia would be non-sensitive material as claimed – see claim 12 of the present application), which would be materials not sensitive to oxidation or nitridation (as they have already been oxidized), and to apply a multilayer coating such as a thermal barrier coating of metallic bond coat followed by ceramic top coat, and to apply the coating to a complex shape such as a turbine vane/blade using the shielded gas system as suggested by Nowotarski and Taylor article with an expectation of desirable coating results, because Zurecki teaches a desirable shielded gas spraying system, and Nowotarski teaches the desire to shield coatings of ceramics and oxides as well as metals, as the shield also prevents contamination as well as oxidation, and Taylor article further teaches that when thermal spraying a desirable coating system to apply is metal bond coats followed by zirconia top coats to*

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a complex shaped substrate such as a turbine vane/blade using a shrouded (shield gas) plasma spraying system. As to the use of ceramic oxides Nowotarski specifically provides that the use of ceramics and oxides is well known when spraying with shielded gas, and Taylor teaches the well known use of zirconia to be sprayed by shielded gas (zirconia would be a non-sensitive material as claimed, as shown by claim 12), and to also apply a multilayer thermal barrier coating of a metallic bond coat followed by a ceramic top coat using a shielded system, and to apply the coating to a complex shape such as a turbine vane blade using a shielded system. Thus, it would not have been "obvious to try" to spray these materials in a shielded gas system but rather expected materials and substrates to use when thermal spraying with shielded gas systems. (3) It would further have been obvious to modify Zurecki to perform the shielding with argon as taught by Nowotarski and Taylor article with an expectation of desirable coating results, because Zurecki teaches the desire to shield with an inert gas, such as nitrogen, and Nowotarski also teaches the desire to shield coating sprays with inert gases, and that inert gas for shielding can beneficially include argon as well as nitrogen and Taylor article further teaches the use of argon as a shielding gas when plasma spraying oxides. As to shielding with argon, the secondary references to Nowotarski and Taylor article specifically show the desire to use argon as well as nitrogen for gas shielding, and thus, it would not have been "obvious to try" to spray with argon shielding gas in a shield gas system, but rather an expected process. (7) As to the specific gas temperature effects of using the shield gas (as claimed in the last six lines of claim 1), it is the Examiner's position that such temperature effects would naturally

occur with the use of the process of Zurecki in view of Nowotarski and Taylor article as described above, because it is the suggested use of the shield gas that provides these gas temperature effects, and the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See Ex parte Obiaya, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). For example, the Examiner notes that Zurecki provides increasing flow rates of shield gas in its own tests (see Table 2, column 11, line 35). Here, the Examiner is not of the position that it would have been "obvious to try" to get these gas results, but rather that they would flow naturally from following the suggestion of the prior art.

Therefore, for the reasons discussed above, the Examiner is of the position that the obviousness of the claimed invention is clearly based on more than "obvious to try."

At pages 11-12 of the Appeal Brief of January 5, 2007, appellant further submits that it is only by improper hindsight that the Examiner could impute the invention as claimed to the disclosures of Zurecki, Nowotarski, and Taylor article. The Examiner disagrees. Appellant has not indicated what modification or position was considered hindsight beyond a statement that merely points out what claim 1 recites. As a result, it appears that for the reasons discussed in the first paragraph of this *Examiner's Response* to section (C), appellant has not provided an actual argument for patentability of the claims. Furthermore, for clarity, the Examiner notes that in response to appellant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness

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is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). Here, as discussed in detail in the paragraph above, and in the rejection of the claims in the *Grounds of Rejection* above, the Examiner has noted what Zurecki specifically teaches, and what features of all the claims Zurecki does not specifically teach. Then, the Examiner has provided the teachings of the secondary references, followed by a motivation statement which addresses the obviousness of modifying Zurecki to provide for every feature not specifically taught by Zurecki. This motivation, as fully described in the paragraph above, is not based on improper hindsight reasoning, but rather only knowledge which was within the level of ordinary skill at the time the claimed invention was made.

(11) Related Proceeding(s) Appendix


No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,


KATHERINE BAREFORD
PRIMARY EXAMINER

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